

From: Eric B James <jameseb@fnal.gov>  
Subject: End of 35-ton Operations  
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To: dune-collab <dune-collab@fnal.gov>

Dear Colleagues,

I would like to give everyone an official update on the status of the 35-ton detector operations. As most of you are aware, the detector was successfully filled in January of this year and has since that time collected a significant sample of cosmic ray data for further analysis. Although the 35-ton cryostat remains cooled and filled for further testing, this past Monday (April 4<sup>th</sup>) marks the official end of the 35-ton operations period.

The last two weeks of operation did not produce any analyzable data due to a failure of the external tubing in one part of the cryogenics system that introduced air into the system and led to the contamination of the liquid argon in the cryostat. During this period, however, the operations team was successful in raising the TPC high-voltage to its nominal value of 120 kV and holding it at that level for on order of a week.

Already, a significant amount has been learned from running the single-phase prototype detectors in the 35-ton cryostat. Among the important accomplishments of the 35-ton effort are the successfully completed cool-down and filling of the cryostat with no negative impacts on the detector elements and the ability of the filtration system to bring the liquid argon purity to the required level within a week of being activated.

On the other side of the coin, operation of the 35-ton detector has revealed noise and stability issues that need to be understood. We were not able to meet the minimum requirement on the signal-to-background level in the electronics readout that has been defined for the far detector. With 35-ton operations now complete, electronics experts have initiated a set of systematic studies focusing on the electronics noise, which will further advance our understanding of these issues over the next few months. In the

meantime, the cosmic ray data collected with the detector will continue to be analyzed and provide input to the design process for the full-scale prototype detector elements that will make up the ProtoDUNE-SP detector.

At the risk of failing to mention the names of many important contributors to the 35-ton effort, I did want to specifically acknowledge the leadership role of Alan Hahn and Michelle Stancari in coordinating the activities associated with the 35-ton program and thank them for their efforts. More detailed presentations on the operation of the 35-ton detector and the continuing analysis of the collected data will be incorporated in the agenda for the next collaboration phone call.

Thanks,  
Eric James